DELINEATING PROTECTION ZONES FOR SPRINGS

Suggested Approach

The best way to determine the protection zones for a spring is to do detailed hydrogeologic analysis. However, if this is not feasible, the California Department of Health Services (DHS) suggests the following method.

Step 1: Determine if the spring is under the influence of surface water (either direct or indirect). (If this determination has been formalized with DHS, make sure to state this in the assessment summary.) If the spring is under the direct influence of surface water, define watershed boundaries as the outer/overall protection area. To define zones within the protection area, or to define zones for ground water springs, proceed with the following steps.

Step 2: Determine the maximum discharge rate of the spring in gallons per minute (gpm). If the discharge rate is not known, and can be assumed to be less than 20 gpm, proceed to the next step. Otherwise, estimate the discharge rate using previously released guidance.

Step 3: Determine, if possible, the approximate thickness of the aquifer from which the spring receives water. If this information isn't available, move on to the next step.

Step 4: Determine an equivalent 'length of screened interval' for the spring. (It is understood that springs don't have a screened interval, but the intent is to estimate the thickness of the aquifer that is available to contribute flow). Use 10% of the thickness of the aquifer OR 10% of the discharge rate in gpm, whichever is less. Regardless, do not use less than 10 feet.

Step 5: Assume an effective porosity of 0.20 (20%)

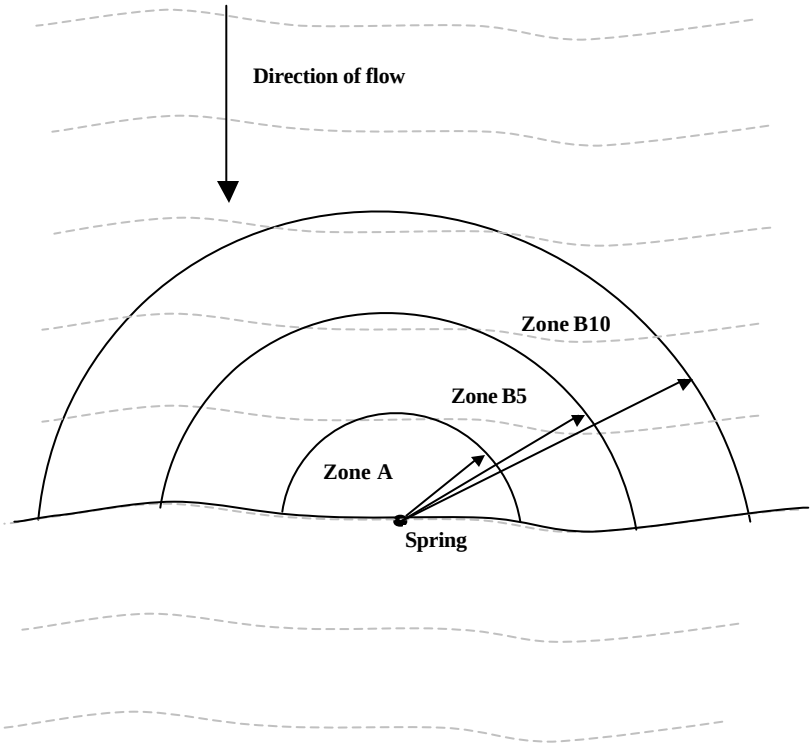
Step 6: Calculate the size of the protection zones for the 2, 5 and 10-year travel times (Zones A, B5 and B10), using the Calculated Fixed Radius method. Use the discharge rate, 'length of screened interval', and effective porosity as described above. If this is a transient system, define only the 2 year time of travel. If the discharge rate is less than 20 gpm, use the minimum distances in the DWSAP program.

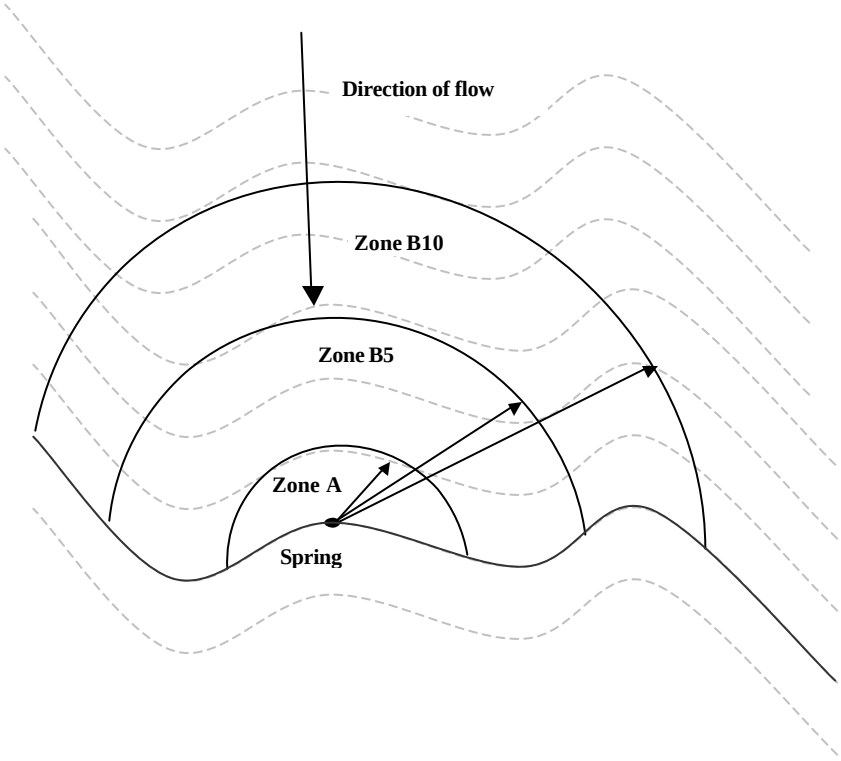
Step 7: If the spring is located in fractured rock increase the size of the zones by 50%.

Step 8: Locate the zones on a USGS quad map. The shape of the zones may be different than for wells, because the springs flow by gravity. Locate the elevation of the spring outlet and draw a topographic contour line at the same elevation. Place the center of the zones at the spring outlet. Draw three zones (one for transient system sources) as semi-circles around the spring outlet. The down gradient limit of the zones is the contour line at the elevation of the outlet (see illustration).

Step 9: Review the delineation and see if it makes sense. Do the protection zones overlap a significant water body? If the water body is up gradient, the spring may be under the influence of surface water.

(See illustrations next page)





Delineation of Protection Zones for Springs